

IN THE CLAIMS:

1. (Currently Amended) A method of imaging an object for dental purposes, comprising the steps of:

- a) projecting a striped pattern on to the object to be imaged,
- b) recording the projected striped pattern as a basic image ( $R_i$ ) with a picture receiver at an angle other than the angle of projection,

steps a) and b) being carried out at a number of different positions of the phase relation of the striped pattern, and

- c) computing an image of said object from the plurality of basic camera images that are out-of-phase with each other ( $R_1, \dots, R_n$ ),

wherein in order to suppress periodic disturbances, i.e., noise, in step c),

~~c1) forming from the basic camera ( $R_1, \dots, R_m$ ) images at least two groups of basic images ( $R_1, R_2, \dots, R_n$ ;  $R_2, \dots, R_{n+1}$ ),~~

~~c2) computing a phase related image ( $P_j$ ) of the object to be imaged from each group of basic images ( $R_1, R_2, \dots, R_n$ ;  $R_2, R_3, \dots, R_{n+1}$ )~~

~~c3) averaging the computed phase related images ( $P_1, P_2$ ) such that a phase related image ( $P$ ) having a reduced amount of noise is~~

formed, and

c1) recording  $(n+2)$  basic images  $(R_1, R_2, \dots, R_{n+2})$  of which successive basic images show a phase shift,

c2) forming three groups of basic images  $(R_1, R_2, \dots, R_n; R_2, R_3, \dots, R_{n+1}; R_3, R_4, \dots, R_{n+2})$ ,

c3) computing a first phase related image  $(P_1)$  from the first group of basic images  $(R_1, R_2, \dots, R_n)$ , a second phase related image  $(P_2)$  from the second group of basic images  $(R_2, R_3, \dots, R_{n+1})$ , and computing a third phase related image  $(P_3)$  from the third group of basic images  $(R_3, R_4, \dots, R_{n+2})$ ,

c4) averaging the first phase related image  $(P_1)$  and the third phase related image  $(P_3)$  in order to obtain an intermediate image  $(P_z)$ , and averaging the second phase related image  $(P_2)$  and the intermediate image  $(P_z)$  in order to obtain a phase related image  $(P)$  having a reduced amount of noise,  $n$  being an integer at least equal to 3, and

c[[4]]5) computing an image of the object to be imaged from the phase related image  $(P)$  having a reduced amount of noise.

2. (Original) A method as defined in claim 1, wherein the computed phase related images  $(P_1, P_2)$  are averaged with weighting factors.

3. (Original) A method as defined in claim 1, wherein the basic images ( $R_1, \dots, R_m$ ) are each recorded with a constant shift of the phase relation of the lattice (19).

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6. (Currently Amended) A method as defined in claim ~~4~~1, wherein  $n$  is 4.

7. (Original) A method as defined in claim 1, wherein the basic images ( $R_1, \dots, R_m$ ) are recorded by an interlacing method so that the two fields are out-of-phase with each other.

8. (Original) A method as defined in claim 7, wherein the two fields show a phase shift relative to each other which is equal to half the phase shift between successive basic images ( $R_1, \dots, R_m$ ).

9. (Original) A method as defined in claim 7, wherein a phase related image ( $P_1, P_2$ ) is computed from each of the fields of a basic image ( $R_1, \dots, R_m$ ) and the two phase related images ( $P_1, P_2$ ) are averaged prior to further processing in such a manner that a phase related image ( $P$ ) having a reduced amount of high-frequency noise is formed.

10. (Original) A method as defined in claim 1, wherein prior to step a), an image of a specific test object is recorded and that on the basis of an analysis of the image of the test object a suitable scheme for

use in the computation of the noise-reduced phase related image for the object to be imaged is selected.

11. (Original) A method as defined in claim 1, wherein the object to be imaged and a camera used for recording the projected striped pattern can be freely positioned relative to each other.

12. (Original) A method as defined in claim 1, wherein an image of one or more teeth in a oral cavity of a patient is recorded by manual surveying over a short measurement period.

13. (Original) A method as defined in claim 1, wherein the image to be created of said object is one of a relief image and a contrast image.

14. (Currently Amended) A device for carrying out the process as defined in claim 1, comprising

[[ - ]] projecting means for projecting a striped pattern on to the object to be imaged,

[[ - ]] a camera for recording the projected striped pattern in the form of a basic image ( $R_1, \dots, R_m$ ) and

[[ - ]] means for computing an image of the object to be imaged from a number of basic camera images ( $R_1, \dots, R_m$ ) that are out-of-phase with each other with formation of ~~at least two~~ three groups of basic images ( $R_1, R_2, \dots, R_n; R_2, R_3, \dots, R_{n+1}$ ).

means for averaging two groups of basic images, and

means for averaging the averaged image with a third group of images.

15. (New) A method of imaging an object for dental purposes, comprising the steps of:

a) projecting a striped pattern on to the object to be imaged,

b) recording the projected striped pattern as a basic image ( $R_i$ ) with a picture receiver at an angle other than the angle of projection,

b1) wherein the basic images ( $R_1, \dots, R_m$ ) are recorded by an interlacing method so that the two fields are out-of-phase with each other,

steps a) and b) being carried out at a number of different positions of the phase relation of the striped pattern, and

c) computing an image of said object from the plurality of basic camera images that are out-of-phase with each other ( $R_1, \dots, R_n$ ),

wherein in order to suppress periodic disturbances, i.e., noise, in step c),

c0) wherein a phase related image ( $P_1, P_2$ ) is computed from each of the fields of a basic image ( $R_1, \dots, R_m$ ) and the two phase

related images ( $P_1$ ,  $P_2$ ) are averaged prior to further processing in such a manner that a phase related image ( $P$ ) having a reduced amount of high-frequency noise is formed,

c1) forming from the basic camera ( $R_1, \dots, R_m$ ) images at least two groups of basic images ( $R_1, R_2, \dots, R_n$ ;  $R_2$ , and  $R_3, \dots, R_{n+1}$ ),

c2) computing a phase related image ( $P_j$ ) of the object to be imaged from each group of basic images ( $R_1, R_2, \dots, R_n$ ;  $R_2, R_3, \dots, R_{n+1}$ )

c3) averaging the computed phase related images ( $P_1$ ,  $P_2$ ) such that a phase related image ( $P$ ) having a reduced amount of noise is formed, and

c4) computing an image of the object to be imaged from the phase related image ( $P$ ) having a reduced amount of noise.

16. (New) A method as defined in claim 15, wherein the computed phase related images ( $P_1$ ,  $P_2$ ) are averaged with weighting factors.

17. (New) A method as defined in claim 15, wherein the basic images ( $R_1, \dots, R_m$ ) are each recorded with a constant shift of the phase relation of the lattice (19).

18. (New) A method as defined in claim 15, including

recording ( $n+1$ ) basic images ( $R_1, R_2, \dots, R_{n+1}$ ) successive basic images showing a phase shift,

forming two groups of basic images ( $R_1, R_2, \dots, R_n$ ;  $R_2, R_3, \dots, R_{n+1}$ ),

computing a first phase related image ( $P_1$ ) from the first group of basic images ( $R_1, R_2, \dots, R_n$ ) and computing a second phase related image ( $P_2$ ) is computed from the second group of basic images ( $R_2, R_3, \dots, R_{n+1}$ ), and

averaging the first phase related image ( $P_1$ ) and the second phase related image ( $P_2$ ) in order to obtain a phase related image ( $P$ ) having a reduced amount of noise,  $n$  being an integer at least equal to 3.

19. (New) A method as defined in claim 15, including

recording ( $n+2$ ) basic images ( $R_1, R_2, \dots, R_{n+2}$ ) of which successive basic images show a phase shift,

forming three groups of basic images ( $R_1, R_2, \dots, R_n$ ;  $R_2, R_3, \dots, R_{n+1}$ ;  $R_3, R_4, \dots, R_{n+2}$ ),

computing a first phase related image ( $P_1$ ) from the first group of basic images ( $R_1, R_2, \dots, R_n$ ), computing a second phase related image ( $P_2$ ) from the second group of basic images ( $R_2, R_3, \dots, R_{n+1}$ ), and computing a third phase related image ( $P_3$ ) from the third group of basic images ( $R_3, R_4, \dots, R_{n+2}$ ), and

averaging the first phase related image ( $P_1$ ) and the third phase related image ( $P_3$ ) in order to obtain an intermediate image ( $P_z$ ), and averaging the second phase related image ( $P_2$ ) and the intermediate image ( $P_z$ ) in order to obtain a phase related image ( $P$ ) having a reduced amount of noise,  $n$  being an integer at least equal to 3.

20. (New) A method as defined in claim 19, wherein  $n$  is 4.

21. (New) A method as defined in claim 15, wherein the two fields show a phase shift relative to each other which is equal to half the phase shift between successive basic images ( $R_1, \dots, R_m$ ).

22. (New) A method as defined in claim 15, wherein prior to step a), recording an image of a specific test object and on the basis of an analysis of the image of the test object selecting a suitable scheme for use in the computation of the noise-reduced phase related image for the object to be imaged.

23. (New) A method as defined in claim 15, wherein the object to be imaged and a camera used for recording the projected striped pattern can be freely positioned relative to each other.

24. (New) A method as defined in claim 15, wherein an image of one or more teeth in a oral cavity of a patient is recorded by manual surveying over a short measurement period.



25. (New) A method as defined in claim 15, wherein the image to be created of said object is one of a relief image and a contrast image.

26. (New) A device for carrying out the process as defined in claim 1, comprising

projecting means for projecting a striped pattern on to the object to be imaged,

a camera for recording the projected striped pattern in the form of a basic image ( $R_1, \dots, R_m$ ),

means for computing an image of the object to be imaged from a number of basic camera images ( $R_1, \dots, R_m$ ) that are out-of-phase with each other with formation of at least two groups of basic images ( $R_1, R_2, \dots, R_n; R_2, R_3, \dots, R_{n+1}$ ), and

means for recording the basic image by an interlocking method.

27. (New) A method of imaging an object for dental purposes, comprising the steps of:

- a) projecting a striped pattern on to the object to be imaged,
- b) recording the projected striped pattern as a basic image ( $R_i$ ) with a picture receiver at an angle other than the angle of projection,

steps a) and b) being carried out at a number of different positions of the phase relation of the striped pattern, and

c) computing an image of said object from the plurality of basic camera images that are out-of-phase with each other ( $R_1, \dots, R_n$ ), wherein in order to suppress periodic noise disturbances in step c),

c1) forming from the basic camera ( $R_1, \dots, R_m$ ) images at least two groups of basic images ( $R_1, R_2, \dots, R_n$ ;  $R_2, R_3, \dots, R_{n+1}$ ),

c2) computing a contrast image ( $P_j$ ) of the object to be imaged from each group of basic images ( $R_1, R_2, \dots, R_n$ ;  $R_2, R_3, \dots, R_{n+1}$ )

c3) averaging the computed contrast images ( $P_1, P_2$ ) such that a contrast image ( $P$ ) having a reduced amount of noise is formed, and

c4) computing an image of the object to be imaged from the contrast image ( $P$ ) having a reduced amount of noise.

28. (New) A method as defined in claim 27, wherein the computed contrast images ( $P_1, P_2$ ) are averaged with weighting factors.

29. (New) A method as defined in claim 27, wherein the basic images ( $R_1, \dots, R_m$ ) are each recorded with a constant shift of the phase relation of the lattice (19).

30. (New) A method as defined in claim 27, wherein

recording  $(n+1)$  basic images  $(R_1, R_2, \dots, R_{n+1})$  successive basic images showing a phase shift,

forming two groups of basic images  $(R_1, R_2, \dots, R_n; R_2, R_3, \dots, R_{n+1})$ ,

computing a first contrast image  $(P_1)$  from the first group of basic images  $(R_1, R_2, \dots, R_n)$  and computing a second contrast image  $(P_2)$  from the second group of basic images  $(R_2, R_3, \dots, R_{n+1})$ , and

averaging the first contrast image  $(P_1)$  and the second contrast image  $(P_2)$  in order to obtain a contrast image  $(P)$  having a reduced amount of noise,  $n$  being an integer at least equal to 3.

31. (New) A method as defined in claim 27, including

recording  $(n+2)$  basic images  $(R_1, R_2, \dots, R_{n+2})$  of which successive basic images show a phase shift,

forming three groups of basic images  $(R_1, R_2, \dots, R_n; R_2, R_3, \dots, R_{n+1}; R_3, R_4, \dots, R_{n+2})$ ,

computing a first contrast image  $(P_1)$  from the first group of basic images  $(R_1, R_2, \dots, R_n)$ , computing a second contrast image  $(P_2)$  from the second group of basic images  $(R_2, R_3, \dots, R_{n+1})$ , and computing a third contrast image  $(P_3)$  from the third group of basic images  $(R_3, R_4, \dots, R_{n+2})$ , and

averaging the first contrast image ( $P_1$ ) and the third contrast image ( $P_3$ ) in order to obtain an intermediate image ( $P_z$ ), and averaging the second contrast image ( $P_2$ ) and the intermediate image ( $P_z$ ) in order to obtain a contrast image ( $P$ ) having a reduced amount of noise,  $n$  being an integer at least equal to 3.

32. (New) A method as defined in claim 31, wherein  $n$  is 4.

33. (New) A method as defined in claim 27, including recording the basic images ( $R_1, \dots, R_m$ ) by an interlacing method so that the two fields are out-of-phase with each other.

34. (New) A method as defined in claim 33, wherein the two fields show a phase shift relative to each other which is equal to half the phase shift between successive basic images ( $R_1, \dots, R_m$ ).

35. (New) A method as defined in claim 33, wherein a contrast image ( $P_1, P_2$ ) is computed from each of the fields of a basic image ( $R_1, \dots, R_m$ ) and the two contrast images ( $P_1, P_2$ ) are averaged prior to further processing in such a manner that a contrast image ( $P$ ) having a reduced amount of high-frequency noise is formed.

36. (New) A method as defined in claim 27, wherein prior to step a), recording an image of a specific test object and on the basis of an analysis of the image of the test object selecting a suitable scheme for use in the computation of the noise-reduced contrast image for the

object to be imaged.

37. (New) A method as defined in claim 27, wherein the object to be imaged and a camera used for recording the projected striped pattern can be freely positioned relative to each other.

38. (New) A method as defined in claim 27, wherein an image of one or more teeth in a oral cavity of a patient is recorded by manual surveying over a short measurement period.

39. (New) A device for carrying out the process as defined in claim 27, comprising

projecting means for projecting a striped pattern on to the object to be imaged,

a camera for recording the projected striped pattern in the form of a basic image ( $R_1, \dots, R_m$ ),

means for computing an image of the object to be imaged from a number of basic camera images ( $R_1, \dots, R_m$ ) that are out-of-phase with each other with formation of at least two groups of basic images ( $R_1, R_2, \dots, R_n; R_2, R_3, \dots, R_{n+1}$ ), and

means for computing a contrast image from the at least two groups of basic images.